

# **Preventive Medicine Update**

**2004 Capital Conference**

**June 7, 2004**

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# **Background & Overview**

- **I took the 2003 recertification exam**
  - **I wrote down PM related questions**
  - **Hopefully, questions/themes will repeat**
- **Focus on highlights & topics not covered in other lectures**
- **Format:**
  - **Discussion**
  - **Question**

# Goals

- **To give an overview of Preventive Medicine (PM) questions that appeared on the 2003 Board exam**
- **To provide knowledge that you can use in your practice**

# **Vaccination in Pregnancy**

- **Live virus contraindicated during pregnancy (MMR, Varicella, Yellow Fever)**
  - **Avoid pregnancy 1 month post immunization**
  - **If immunized, not an indication for termination**
- **Influenza should be given to all women who will be pregnant during influenza season\***
- **Rabies, Hepatitis A & B, meningitis**
  - **Risk benefit ratio**

# Question 1

- **Which immunization is contraindicated during pregnancy?**

**1. Influenza**

**2. Rabies**

**3. MMR**

**4. Tetanus**

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# **Ionizing Radiation**

- **80% natural, 20% manmade**
- **Natural**
  - **Radon (Major source)**
  - **Cosmic radiation**
  - **Terrestrial radiation**
  - **Ingested (P40 other)**
- **Manmade**
  - **Radiological devices most common**
    - **X-ray**
  - **Other sources**
    - **Smoke detectors, TV, high voltage vacuum switches**

# Question 2

**The most common exposure source of ionizing radiation to the general U.S. public is?**

- 1. Background (natural) sources**
- 2. Radiological devices**
- 3. Nuclear power**
- 4. Electronic devices**



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# **Meningococcal Meningitis Prophylaxis**

- **Primary means of prevention of sporadic meningococcal disease is antimicrobial chemoprophylaxis of close contacts**
- **Close contacts**
  - **Household members**
  - **Day care center contacts**
  - **Anyone exposed to patients oral secretions**
    - **CPR, ET tube management**
    - **Kissing**
- **Should use either Rifampin, Ceftriaxone or Ciprofloxacin**
  - **Index case also needs nasal eradication**
  - **Should use one of these antibiotics**

# Question 3

- **A soldier who lives in the barracks was diagnosed with Meningococcal meningitis. He required mechanical intubation shortly after a LP. Who should not routinely receive post exposure prophylaxis?**
- 1. His roommate**
  - 2. All soldiers in his platoon**
  - 3. His girlfriend**
  - 4. The team involved in the code (intubation)**

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# Medical Review Officer

- **Methamphetamine exists in two structural forms known as enantiomers**
  - Mirror images (left and right hand)
- **Amphetamines have a D & L form**
  - D form strong central nervous stimulant
  - L form primarily peripheral action
    - Vicks inhaler & Selegiline metabolite
- **Laboratory can perform D & L separation**
- **Military laboratory does the separation**
  - Will only report if >20% D-Methamphetamine

# Question 4

- **A drug test is required for a sensitive government position. A potential employee tests positive for amphetamines. What “legitimate” medication could cause this?**
- 1. Vicks inhaler**
  - 2. Pseudoephedrine**
  - 3. Deconamine**
  - 4. Tylenol**

# Question 4

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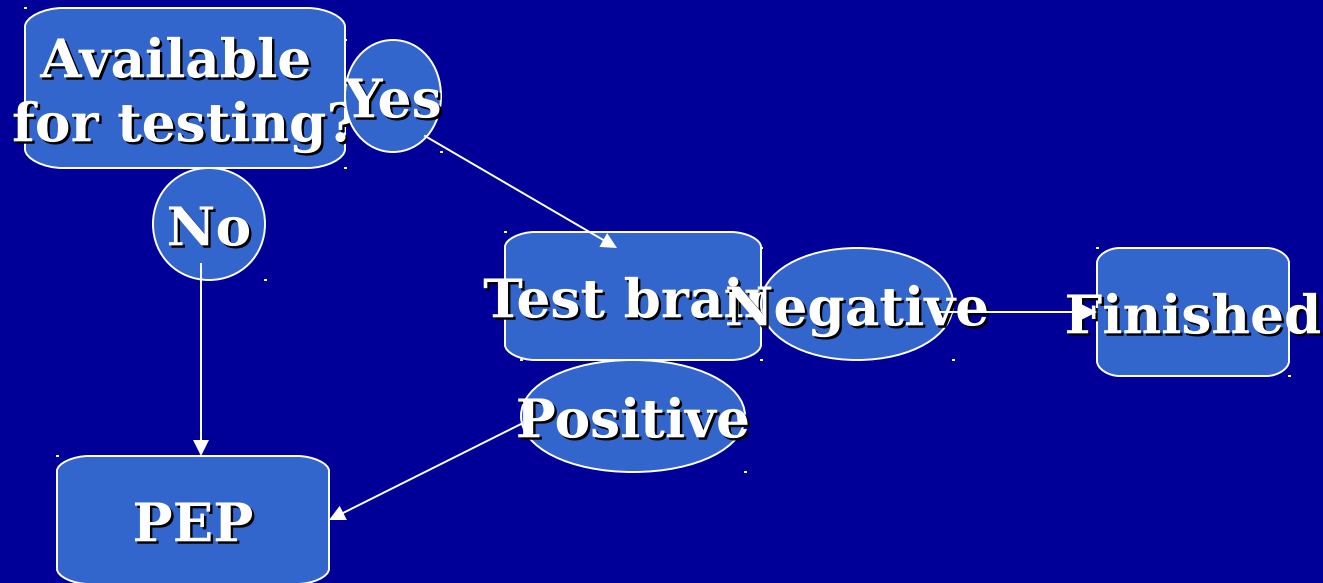
- 1. Vicks inhaler**
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# Rabies Prophylaxis

- Administration of rabies post-exposure prophylaxis (PEP) is an urgency, not an emergency
- Animals with a high risk of causing rabies
  - Wild dogs & cats
  - Raccoons
  - Skunks
  - Bats
  - Foxes
  - Coyote
  - Woodchucks
    - 86% rodent rabies cases (N= 368)



# Flow Sheet for High-Risk Animals



## PEP

One dose of immune globulin (RIG)

Five doses of rabies vaccine (RV) over a 28-day period

# Question 5

- **A hunter reports to the emergency room after being splashed by fluids after shooting a strange behaving Raccoon. What management step should you perform?**
- 1. Immediately give rabies immune globulin and start rabies immunization & rabies vaccine**
  - 2. Test the brain of the animal (if available)**
  - 3. Give prophylactic antibiotics and arrange for close follow up**
  - 4. Reassure the patient and send him home**

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# **Dog Bites**

- **Annually**
  - **4.4 million animal bites**
    - **4 million (91%) are dog bites**
  - **800,000 people receive medical care**
  - **Dog bites result in approximately 12 deaths**
- **Children are the victims in 60% of dog bites**

# **Dog Bites**

- **All dogs can potentially bite**
- **Often non provoking behavior in children**
  - **Sleeping baby**
- **Prevention measures for children**
  - **Never leave a young child unattended**
  - **Avoid humanizing the dog**
  - **Teach children basic dog safety**
  - **Avoid wrestling & running around dogs (unfamiliar)**
  - **An older dog should not be introduced into a household with children**
    - **Puppy less than 4 months preferred**

# Question 6

- **What group has the highest risk of becoming a dog bite victim?**
- 1. Elderly**
  - 2. Children**
  - 3. Dog owners (adults)**
  - 4. Veterinarians**

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# **TB Booster reaction**

- **Prior infection Mycobacterium Tuberculosis**
- **Immunity may wane over time**
- **Initial testing may be negative**
  - **This test boosts immunity**
- **Repeat test positive**
- **Misinterpreted as a recent infection or exposure**



# **Two-step TB Testing**

- **Recommended as the initial test for groups who will undergo repeat testing**
  - **Hospital workers**
  - **Prison workers**
- **If initial test negative, repeat 1-3 weeks**
- **If second positive, boosted reaction**
  - **Old infection**

# Question 7

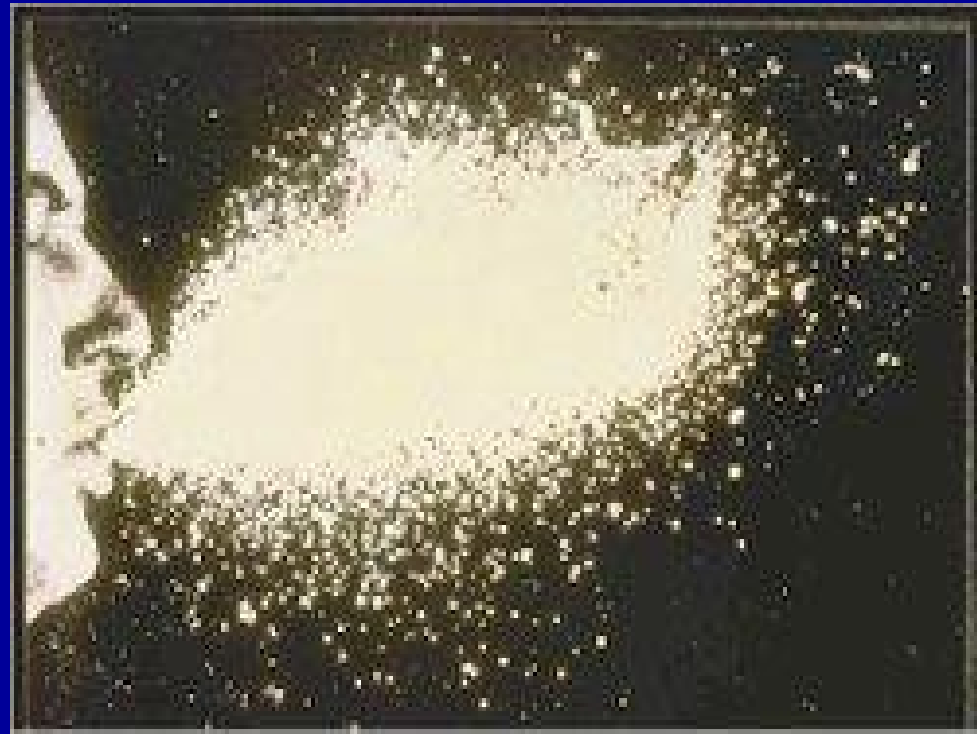
- **Of the following people, who should receive a two-step TB testing?**
  - 1. A new employee in a hospital**
  - 2. A person exposed to a confirmed TB case**
  - 3. A homeless person in a shelter**
  - 4. A soldier returning from overseas deployment**

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# Natural History of TB

- **Spread by respiratory droplets**
- **Exposure can result in**
  - Latent infection
  - Active infection
- **Risk of developing active TB from latent**
  - 10% lifetime
    - 5% first year
    - 5% rest lifetime
  - HIV (AIDS)
    - 7-10% annual



1. Jerant AF, Identification and Management of Tuberculosis  
American Family Physician, May 1 2000

2. Core Curriculum on Tuberculosis 4th edition; available CDC MMWR CME

# TB Information

- **Groups that should be tested TB (PPD)**
  - **People at higher risk of exposure**
    - Close contacts of TB cases
    - Foreign born from areas of high TB prevalence
    - High risk congregate settings (prisons)
  - **People at higher risk of TB disease**
    - HIV
    - IV drugs
- **Treatment cut off depends on level of risk**
  - **5 mm: High risk exposure or active disease**
    - close contacts
  - **10 mm: Moderate risk**
    - IV drug usage, arrivals high risk areas
  - **15 mm: No known risk factors**

25% Active TB cases may have a negative PPD

# **Positive PPD Evaluation**

- **Measure induration not erythema**
- **Clinical evaluation: History & CXR**
- **If the evaluation is reassuring**
  - **Latent TB**
    - **9 months of Isoniazid**
- **If suspicious of active disease**
  - **AFB smear**
  - **Culture**
  - **4 drug regiment (Resistance concern)**
  - **Consider direct observed therapy (DOT)**

# Question 8

- A new vaccine advertises that it decreases the incidence of disease X by 50%. You review the literature and see the rate of disease X is 2.0/1000 with placebo and 1.0/1000 after immunization. What is the number needed to treat (NNT)?

1. 1
2. 1000
3. 10,000
4. 500

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# Statistical Comparison of Groups

- **Relative scale**
  - Ratio (Relative risk, odds ratio)
  - Rate 1/ Rate 2
- **Absolute scale**
  - Rate 1 – Rate 2 (Absolute risk reduction)

# **Number Needed To Treat (NNT)**

- **1/ ARR (Absolute Risk Reduction)**
- **Must be per person**
  - **Not % or per 1000**
- **2 per 1000 and 1 per 1000**
  - **.002 & .001**
- **ARR= .002-.001= .001**
- **NNT= 1/.001= 1000**

# Take Home Point

- **50% risk reduction sounds great!!**
- **A large relative reduction may be a small absolute reduction and not effect your practice**
  - **Example: You will only immunize 500 people**

# **Number needed to harm (NNH)**

- **Exactly like NNT**
- **Look at direction of change**
- **In prior question**
  - **If after immunization, disease rate 3/1000**
  - **Placebo is 2/1000**
  - **Immunization produced a negative effect or NNH**

# USPSTF: Should Not Do

- (D recommendation)
  - **Recommends against screening average risk asymptomatic pregnant for BV**

# USPSTF Intermediate

- **Insufficient evidence (I recommendation)**
  - **Routine screening high-risk pregnant women for bacterial vaginosis**
- **No recommendation (C recommendation)**
  - Routine Chlamydia screening asymptomatic low risk females & pregnant >25

# USPSTF: Should Do

- **Strongly recommends** (A recommendation)
  - **screen all adults for tobacco use and provide tobacco cessation interventions**
  - **screen all pregnant women for tobacco use and provide augmented pregnancy-tailored counseling to those who smoke**
- **Recommends** (B recommendation)
  - **Screening for type 2 diabetes in adults with hypertension or hyperlipidemia**

# Question 9

- Which of the following statements concerning USPSTF recommendations is false?
  1. There is insufficient evidence for or against routine HTN screening in children and adolescents
  2. Screen all pregnant women for Bacterial vaginosis (BV)
  3. The evidence is insufficient to recommend screening for gestational diabetes
  4. Recommends against the routine use of estrogen and progestin for prevention of chronic conditions in post menopausal women for chronic conditions



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# USPSTF

- **Statements on ~ 73 topics**
  - **Evidence based recommendations**
  - **Periodic updates (6 year cycle)**
  - **Recommendations will change\***
- **Updates available on list serve**
  - **<http://www.ahrq.gov/clinic/uspstfix.htm>**

\* Ugwumau A et al. Effect of Early Clindamycin on late miscarriage and preterm Delivery in asymptomatic women with abnormal vaginal flora and bacterial vaginosis. Lancet March 22, 2003

# Sensitivity/Specificity

## Disease

Yes

No

Test		Disease	
		Yes	No
+		<b>True Positive (A)</b>	<b>False Positive (C)</b>
	-	<b>False negative (B)</b>	<b>True Negative (D)</b>

Sensitivity = true positive/ all with disease  
 $A / (A + B)$

Specificity = true negative/ all without disease  
 $D / (C + D)$

# Question 10

- 200 people in a cohort of 1000 people have biopsy proven colon cancer. A new blood test correctly identifies 150 cancer patients. The test gives a positive result in 200 people without colon cancer. What is the sensitivity and specificity?
1. Sensitivity 99% Specificity 95%
  2. Sensitivity 75% Specificity 75%
  3. Sensitivity 50% Specificity 95%
  4. Sensitivity 95% Specificity 50%

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  4. Sensitivity 95% Specificity 50%

# Solution Question 10

		Disease	
		Yes	No
		200	800
Test	+	<b>True Positive (150)</b>	<b>False Positive (200)</b>
	-	<b>False Negative (50)</b>	<b>True Negative (600)</b>

Sensitivity = true positive/ all with disease =  $150/200 = .75$   
 $A / (A + B)$

Specificity = true negative/ all without disease =  $600/800 = .75$   
 $D / (C + D)$

# Question 11

- Which of the following tests will detect the most patients with disease X?
  1. Sensitivity 80 %, Specificity 80%
  2. Sensitivity 85%, Specificity 75%
  3. Sensitivity 90%, Specificity 70%
  4. Sensitivity 95%, Specificity 65%

# Question 11

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# Positive Predictive Value (PPV)

- In clinical practice, you don't know if the patient has disease
- Positive and negative predictive value can be used to answer
  - Is a positive test positive?
  - Is a negative test negative?

PPV= true positives/all positive tests  
 $A / (A + C)$

Test

+

		Yes	<del>Disease</del> No
Test	+	True Positive (A)	False Positive (C)
	-	False Negative (B)	True Negative (D)

NPV= true negatives/all negative tests  
 $D / (B + D)$

# **Flying With Oxygen Requirements**

- **Airplanes are pressurized to 8000 feet**
- **If O<sub>2</sub> is required at sea level, will need at higher altitude**
- **Airlines can supply, patient can not**
  - **Fee**
  - **Need a physicians note medical clearance**
  - **Passengers must arrange layover o<sub>2</sub>**

**Bettes TN, Mckenas DK, Medical Advice for Commercial Air Traveler  
American Family Physician, September 1, 1999**

# **Flying after Diving**

- **Reduces pressure at altitude can make one susceptible to the bends or decompression illness (DCS)**
- **To reduce risk of DCS**
  - **Wait 12 hours to fly after one dive**
  - **Wait 24 hours if multiple dives**

# Question 12

- Which of the following is not a contraindication to airline travel?
  1. Myocardial infarction in the last two weeks
  2. Someone who scuba dived 6 hours ago
  3. Active tuberculosis
  4. COPD requiring 2-liters oxygen at minimal exertion

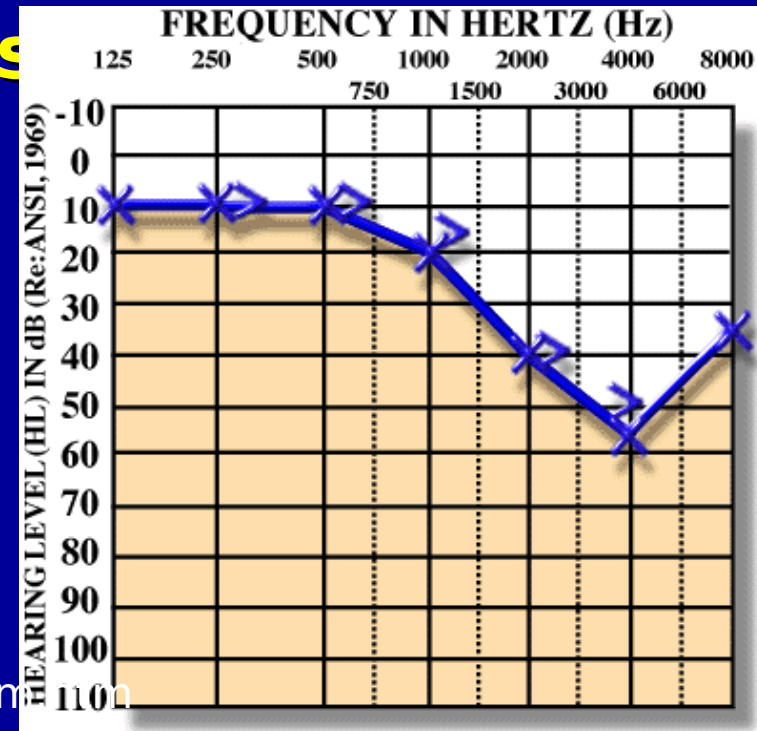
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# Question 13\*

**This Audiogram demonstrates**

- 1. Normal hearing**
- 2. Sensorineural Hearing Loss**
- 3. Conductive hearing loss**
- 4. Mixed hearing loss**

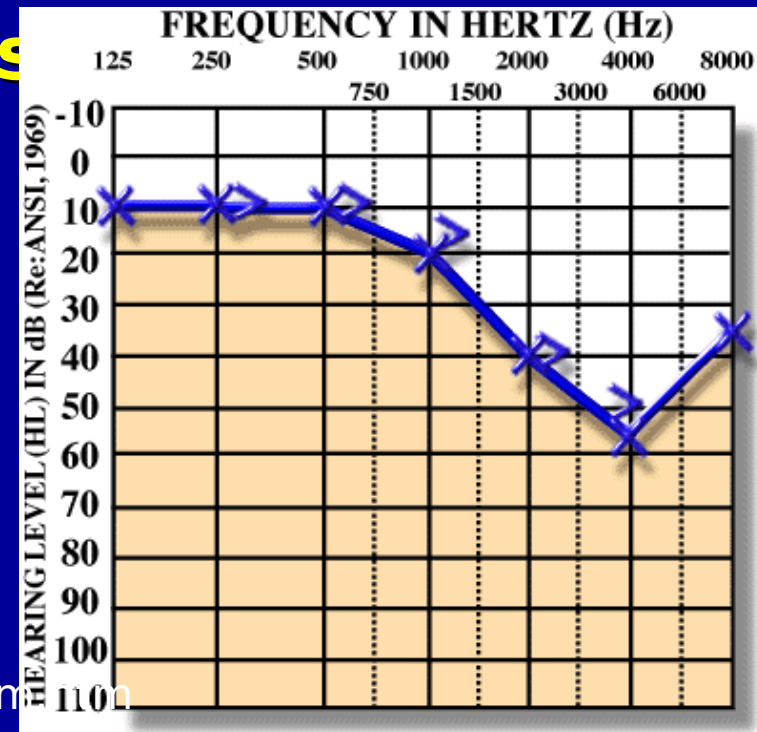


\*Audiograms available on line at  
<http://www.audiologyawareness.com/hhelp/audiogram>

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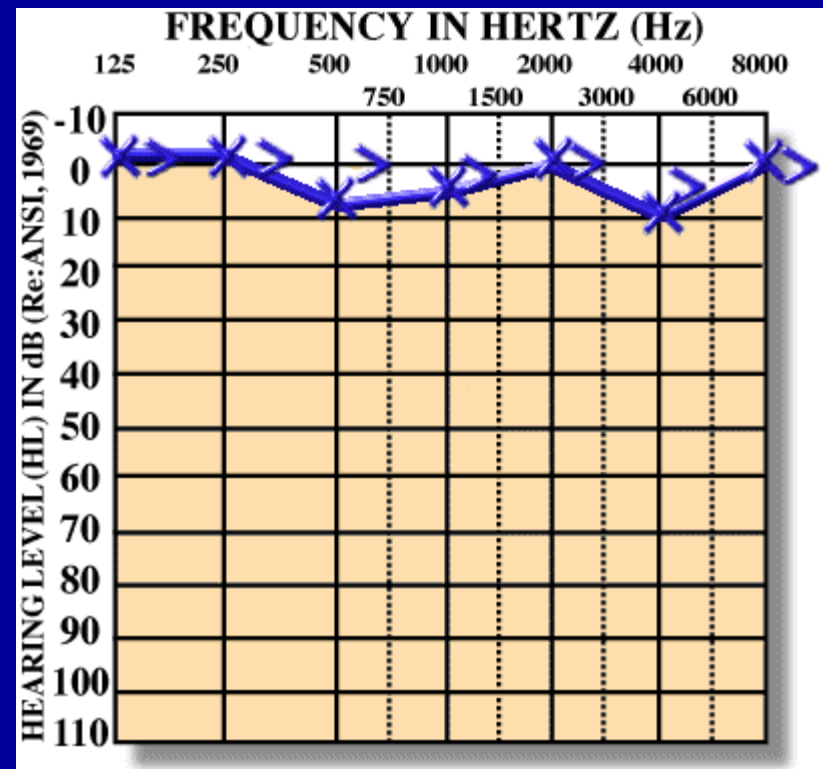
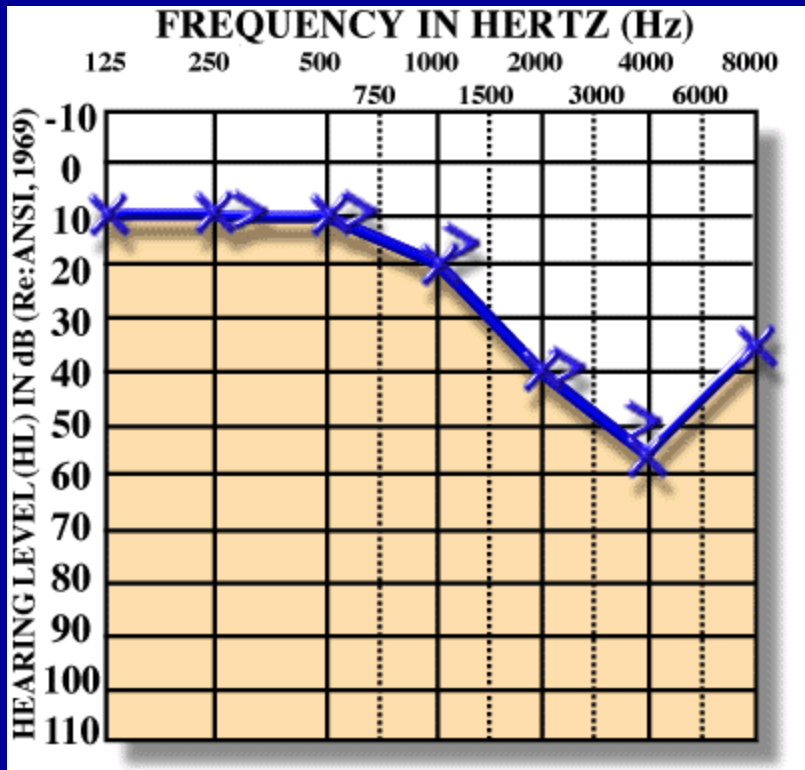


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# Audiograms\*

Sensorineural Hearing Loss

Normal Hearing



\*Audiograms available on line at  
<http://www.audiologyawareness.com/hhelp/audiogrm.htm>



# Leading Causes of Death: 2001\*

Cause	Total	Males	Females
	Rank	Number (Rank)	Number (Rank)
<b>All causes</b>		1,183,421	1,233,004
<b>Heart Disease</b>	1	339,095 (1)	361,047 (1)
<b>Cancer</b>	2	287,075 (2)	266,694 (2)
<b>Cerebrovascular</b>	3	63,177 (4)	100,361 (3)
<b>Chronic lower respiratory DZ</b>	4	59,697 (5)	63,316 (4)
<b>Accidents†</b>	5	66,060 (3)	33,477 (7)
*Source: National Center for Health Statistics CDC		†Unintentional	

# Question 14

- **The most likely cause of death of a female in the United States is?**
- 1. Breast cancer**
  - 2. Stroke**
  - 3. Cardiovascular disease**
  - 4. Injury**

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# Estimated Cancer Deaths: 2004 \*

Men

Women

<b>Lung (32)</b>	<b>Lung (25)</b>
<b>Prostate (10)</b>	<b>Breast (15)</b>
<b>Colorectal (10)</b>	<b>Colorectal (10)</b>
<b>Other (48)</b>	<b>Other (50)</b>

# Deaths From Accidents\*

- **Unintentional injuries (Accidents)** are the leading cause of death from age 1 to 34
- **Combined: Unintentional injuries, homicide, & suicide**
  - 75 % deaths age 15–19
  - 72 % deaths age 20–24
  - 53 % deaths age 25–34

\*Deaths: Leading Causes for 2001; National Center of Health Statistics

# **Questions Covered in Other Lectures**

- **Bioterrorism**
  - **1 question**
  - **Anthrax length of treatment after exposure**
  - **Don't discount smallpox**
- **Hepatitis B interpreting serology**
- **Case scenario followed by questions**
  - **occupational blood borne exposure**

# **Occupational Blood Borne Exposure**

- **Risk of Disease: Blood borne pathogens (BBP)**
  - **HIV**
    - **0.3% needle stick**
    - **0.09% mucous membrane (MM)**
  - **Hepatitis C 1.8% (needle stick not MM)**
  - **Hepatitis B 23-27%**
- **Most hepatitis B infections not needle stick**
  - **Hepatitis B Can survive in dried blood for a week**
  - **Transmitted through cracks in the skin**
- **Prevention**
  - **Hepatitis B immunization**

# Diarrhea Questions

- **Viruses account for 80% cases**
  - Rotavirus most common
- **Bacteria 10-20%**
- **Parasites (Giardia) 10%**



# Diarrhea Questions (cont.)

- **Diarrhea: seldom find a cause\***
  - **30,000 stool specimens**
  - **specific pathogen in only 5.6% of cases**
  - **In descending order**
    - ***C. jejuni***
    - **Salmonella,**
    - **Shigella**
    - ***E. coli* O157:H7 (Shiga Toxin)**
      - **Associated with hemolytic uremic syndrome**

\*Guerrant RL, et al. Practice guidelines for the management of infectious diarrhea. Clin Infect Dis February 1, 2001;32:331-48.

# Acknowledgements

- **MAJ Bryan Smith**
- **MAJ Vicki Hughes**
- **LTC Robert Mott**

# Questions?

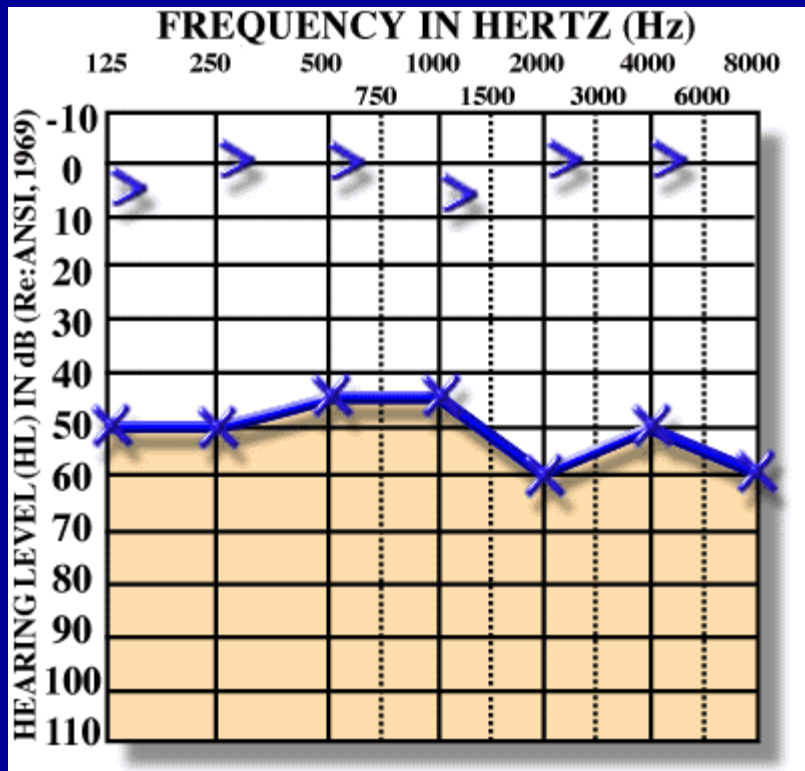
- **Contact information:**  
[eric.e.shuping@US.army.mil](mailto:eric.e.shuping@US.army.mil)

Fort Knox Kentucky

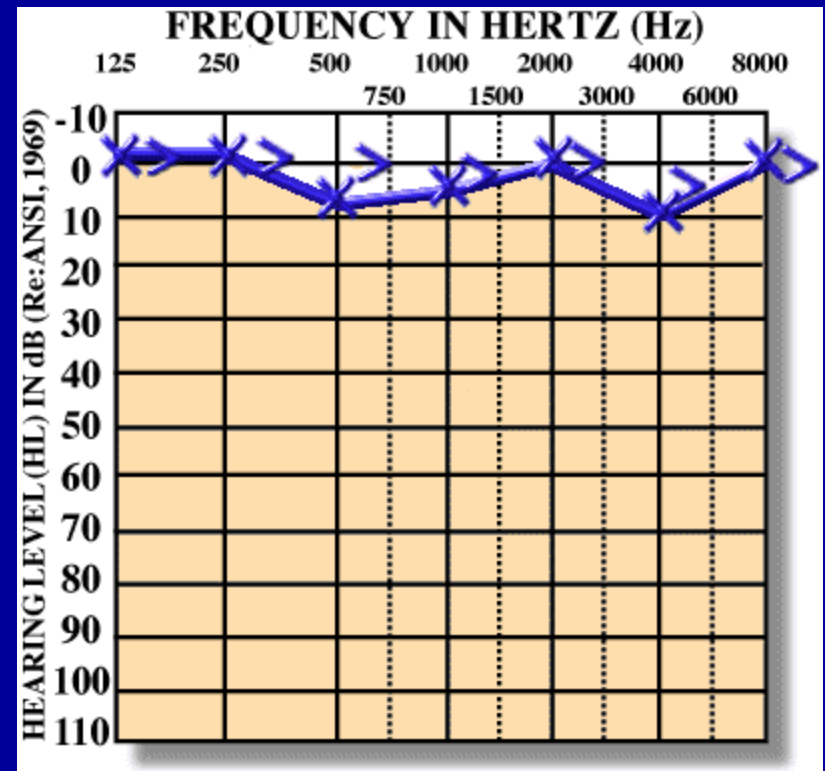


# Audiogram\*

Conductive Hearing Loss



Normal Hearing



\*Audiograms available on line at  
<http://www.audiologyawareness.com/hhelp/audiogrm.htm>

# Case Study: 2 patients

- **Patient 1**
  - 24 y/o female presenting to a STD clinic with vaginal discharge. History of multiple partners.
  - Pretest probability of patient having Trichomonas is 50%\*
- **Patient 2**
  - 24 y/o female presents for Prenatal pap smear at 12 weeks. No vaginal symptoms. Stable relationship for 3 years.
  - Pretest probability of patient having Trichomonas is 3%\*

# 2 X 2 Table For Patient 1 (Wet Prep)

- **1000 patient cohort**
- **Pretest Probability**  
– 50% (STD clinic)
- **Sensitivity 68%**
- **Specificity 99.9%**
- **PPV is 100%**

Trichomonas Prese			
		+	-
Test	+	500 (disease )	500 (No disease)
	-	340	0
Test	+	160	500
	-		

# 2 X 2 TABLE FOR PAP SMEAR

Prevalence is most important factor in predictive v

- **1000 patient cohort**
- **Pretest Probability disease**
  - 3%
- **Sensitivity 58%**
- **Specificity 97%**
- **PPV is 37%**

		Trichomonas Presence	
		+	-
Test	+	30 disease	970 no disease
	-	17	29
		13	941

# Summary of 2 Patients

- **Sensitivity and Specificity similar for pap and wet prep**
- **The high prevalence in Patient 1's cohort gives a PPV 100%**
- **The low prevalence in Patient 2's cohort gives a much lower PPV (37%)**
- **These PPVs have implications in treatment and counseling**
- **Consider retesting patient 2**



# **Blood Borne Pathogens Needle Stick Procedures**

- **Hospital or clinic SOP will have the following actions**
  - **Check the index patient**
    - **HIV, Hepatitis C & B**
  - **Serial blood tests on health care worker**
    - **HIV, Hepatitis C & B**
  - **Consider HIV prophylaxis**

# Rifampin to Eradicate Menigococcus

- **General: PO, BID, for 2 days**
- **Child to adult cut off**
  - **60 kg (132 LBS) cut off for max dosage 600 mg**
- **Not to be given in pregnancy**
- **may interfere with oral contraceptives**

Age Group	Dosage	Duration
Children <1 month	5 mg/kg Q12	2 days, orally
Children ≥1 month	10 mg/kg Q12	
Adult	600 mg Q12	

# **Cipro & Rocephin to Eradicate Meningioccocus**

- **Ciprofloxacin given as a single oral dosage 500 mg (for adults only)**
- **Contraindications**
  - **Not be given <18, pregnancy or lactating**
  - **May be used in children if no other alternative**
- **Rocephin: single IM dose 125 mg <15 years and 250 mg for adults.**

# PPD: 5 mm Cut off

**$\geq 5$  mm is classified as positive in**

- HIV-positive persons
- Recent contacts of TB case
- Persons with fibrotic changes on chest X-ray consistent with old healed TB
- Patients with organ transplants and other immunosuppressed patients

Obtained from the Core Curriculum Tuberculosis, What Every Clinician Should Know Fourth Edition, 2000 (slide 33) page 30 available on line at

# PPD: 10 mm Cut off

**$\geq 10$  mm is classified as positive in**

- Recent arrivals from high-prevalence countries
- Injection drug users
- Residents and employees of high-risk congregate settings
- Mycobacteriology laboratory personnel
- Persons with clinical conditions that place them at high risk
- Children < 4 years of age, or children & adolescents

**exposed to adults in high-risk categories**

# PPD: 15 mm Cut off

**$\geq 15$  mm is classified as positive in**

- Persons with no known risk factors for TB

Obtained from the Core Curriculum Tuberculosis, What Every Clinician Should Fourth Edition, 2000 (slide 35) page 31 available on line at

# Occupational Exposure to TB

- **Appropriate Cutoff Depends on**
  - Individual risk factors for TB
  - Prevalence of TB in the facility

Obtained from the Core Curriculum Tuberculosis, What Every Clinician Should Know Fourth Edition, 2000 (slide 36) page 31 available on line at